



# Labial ring flap: a new flap for metaidoioplasty in female-to-male transsexuals

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## KEYWORDS

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surgery

**Summary** *Objective:* To describe the technical details of our experience in performing metaidoioplasty.

*Patients and methods:* After the first officially approved sex-reassignment surgery on a patient with transsexualism was performed in Japan, we performed metaidoioplasties on 69 female-to-male transsexuals between 1998 and 2007. Oophorohysterectomy and metaidoioplasty were performed by a one-stage procedure. Hage's technique was used on the first 26 cases. The labial ring flap technique was performed on 43 patients (aged 18–33 years) after 2005. This new technique uses all the labia minora skin incorporated with the anterior vaginal flap for urethral lengthening. The clitoral chordae is also released by this procedure.

*Result:* Using this method, we obtained a neo-urethra of a good diameter and a more male-like appearance for external genitalia along with a minipenis. The postoperative course was uneventful in 28 of 43 cases. Urethral fistula occurred in 12 cases, which was spontaneously closed in eight cases. Four other cases required secondary repair. Three cases with neo-urethral stenosis were treated by urethral dilation. Of the 43 cases, 28 can void in a standing position. For five patients who desired a larger phallus, various phalloplasty techniques were performed subsequently.

*Conclusion:* Satisfactory urine stream and appearance were achieved. Metaidoioplasty with minimal scarring can be selected independently or as the first step followed by phalloplasty if the patient requires such an operation.

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The surgical goals of sex-reassignment surgery (SRS) in female-to-male transsexuals (FTMTs) are defined as: (1) removal of female reproductive function; (2) elimination of female features and creation of male-like appearance for external genitalia; (3) creation of a competent neo-urethra for voiding in a standing position and (4) increasing rigidity

of the neo-phallus for sexual activity. To achieve these goals, many forms of surgery, such as bilateral mastectomy, oophorohysterectomy, vaginal closure, clitoral release, urethral lengthening and phalloplasty, are performed in multistaged procedures. A wide variety of combinations of these surgeries are reported.

Although microsurgery enables phalloplasty in a single-stage procedure, construction of the perineal part of urethra in FTMTS is usually performed in a separate session.<sup>1</sup> Various techniques are used: abdominal skin flaps, labial skin flaps, pedicled flaps from intestine or bladder, bladder mucosa grafts, skin grafts and free microvascular flaps.<sup>1</sup> On the other hand, since 1991, Hage has applied metaidoioplasty by combining Laub's clitoral-release and Bouman's urethral-construction techniques and defined it as an alternative for patients who seek to change their external genitalia, but who want to avoid the extensive scarring associated with more phalloplasty.<sup>2,3,5</sup> This surgery uses a flap of the skin from the vagina along with the labia minora to create a clitoral-urethral extension. The clitoral chordee is also released by this procedure. The result is that the opening of the neo-urethra reaches the tip of the glans clitoris. The use prepuce skin<sup>3</sup> or buccal mucosa<sup>14</sup> was also reported for the same purpose.

In Japan, SRS had been illegal for 40 years. We performed the first officially approved FTMTS sex-reassignment surgery in September 1998 after deliberations by the ethical committee of the university.<sup>6</sup> There was almost no accumulated technical and therapeutic knowledge among either health providers or patients. Most of the patients who became acquainted with the condition requested phalloplasty at their first medical examination. In our previous experience of 26 cases of metaidoioplasty from 1998, the neo-urethra was constructed according to Hage's technique<sup>1</sup> combined with colpocleisis as the first stage of genital conversion in FTMTS. Microsurgical phalloplasty was planned as the second stage in an attempt to reduce the total number of surgical procedures, thus also reducing medical fees. We found that Japanese FTMTSs, however, had poorly developed labia minora and clitoral body or narrow vagina compared to those of Caucasian FTMTSs. These factors limited the size of the labial flap or anterior vaginal flap. Voiding while standing as a male social behaviour<sup>5</sup> is one of the important goals of FTM transformation. However, in these cases, it was difficult to obtain a sufficient length or diameter of the neo-urethra, which resulted in a high rate of postoperative urethral fistula or stenosis.

By developing an original form of metaidoioplasty using a labial ring flap, we obtained favourable results. This article describes our surgical techniques and discusses our results.

## Materials and methods

### Patients

From February 2005, the labial ring flap was used in metaidoioplasty with or without colpocleisis (Table 1) in 43 patients. All the patients had received bilateral subcutaneous mastectomy and had been treated hormonally for

**Table 1** Sex-reassignment surgery for female-to-male transsexuals (1998–2007).

Surgical procedure	Number
ATH + BO	3
ATH + BO +clitoral release	6
ATH + BO +Hage's metaidoioplasty	26
ATH + BO +Ring flap +vaginal closure	7
ATH + BO +Ring flap –vaginal closure	36
Total number	78

ATH, abdominally total hysterectomy; BO, bilateral oophorectomy.

a mean period of 45 months (range: 6–131 months) before surgery after receiving a consensus from a team of professional clinicians and the ethics committee.

In seven cases, trans-abdominal oophorohysterectomy and colpocleisis were performed using a one-stage procedure. In 36 cases, oophorohysterectomy without vaginal closure was done.

No cases received testicular implant simultaneously. Follow-up period ranged from 3 months to over 8 years (mean: 30 weeks).

## Methods

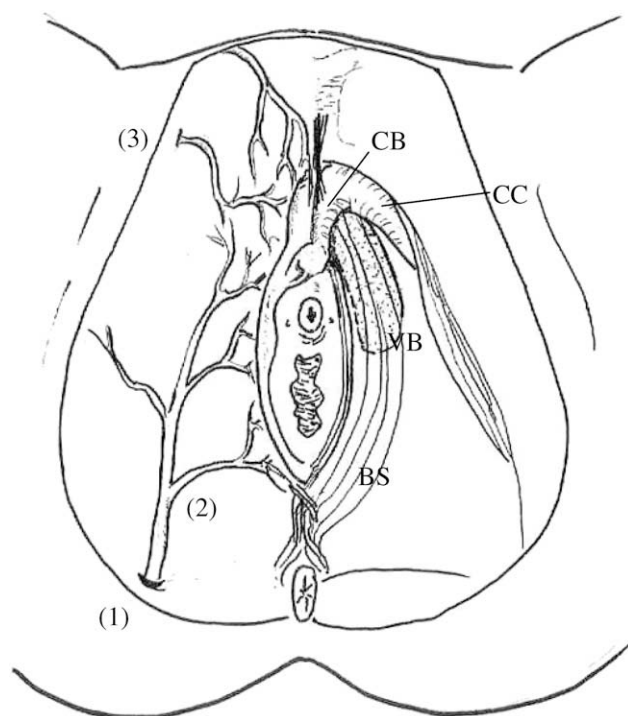
### Anatomy of surgical technique

A basic understanding of the homologue between human clitoris and penis should benefit a logical surgical approach to ensure functional and morphological results. However, the basic female perineal anatomy has been described in a cursory manner.<sup>7–10</sup>

The internal labia are a homologue of the male urethra and can be an optimal source for urethral reconstruction. There are few descriptions of the arterial supply to the labia minora or vestibule in anatomy textbooks, but the posterior labial branches of the perineal artery, urethral artery, dorsal artery of clitoris and the anterior branches of the external pudendal artery can contribute to their vascularisation. There are rich vascular anastomoses among them (Figure 1).<sup>12,13</sup> The chordae is a firm connective tissue on the ventral surface of the corpus cavernosum with well-developed spongiosal tissue, which adheres to the corporal bodies.<sup>3,11</sup> The female erectile tissue components are corpus cavernosum, bilateral crura of clitoris and vestibular bulb, which are enlarged well by androgen hormone therapy. These have three 3-dimensional communications with each other anteriorly to the external urinary meatus.<sup>10</sup>

Bulbospongious muscles rise posteriorly in the perineal body, cover the vestibular bulb and attach to the clitoral body, which narrows the vaginal orifice. However, they are less developed and do not unite at the midline as do the same muscles of a male.

The dorsal nerve of the clitoris innervates the glans of the clitoris. At the lateral limit of the ischiopubic ramus, the neurovascular bundle runs medially along the top surface of the corpora and enters the deep aspect of the glans.

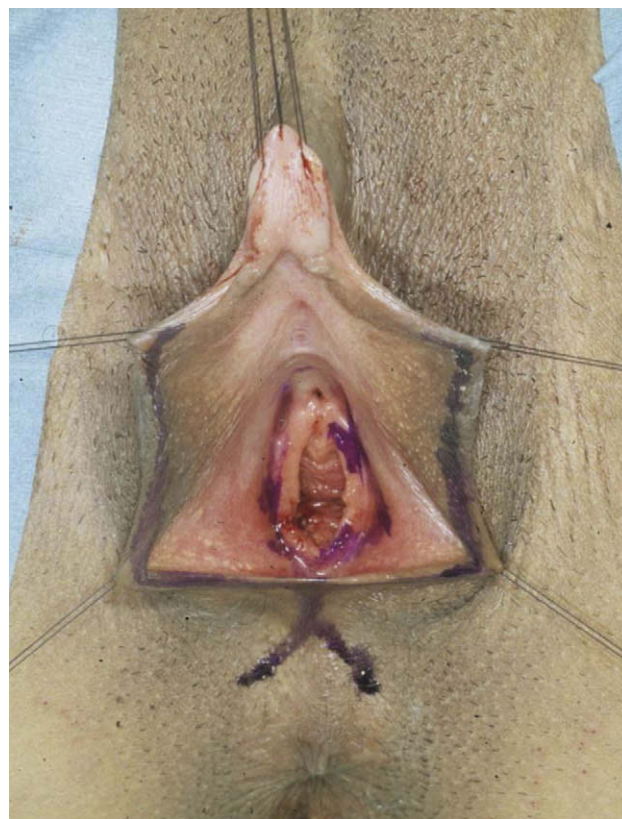


**Figure 1** Urogenital vessels to the perineal region in the left side. (1) Perineal artery (branch of external pudendal artery), (2) posterior labial branches and (3) anterior branches of the external pudendal artery. The superficial fascia is removed on the right side. (CB) clitoral body, (CC) crus of clitoris, (VB) vestibular bulb, (BS) bulbospongiosum muscle.

## Operative method

### Ring flap technique

The patient is placed in the exaggerated, lithotomic, head-down position under general anaesthesia. Trans-abdominal oophorohysterectomy by gynaecologists and meta-idoioplasty by plastic surgeons are performed simultaneously. Anterior traction of the clitoral glans with a suspension system<sup>14</sup> is used to maintain the small clitoris and the neo-urethra spongiums of clitoris and neo-urethra during this operation. A small circle shaped like a drop of water is designed around the urethral meatus and vaginal orifice. The outer half ring is placed on the ridge of the labia minora. The labial ring flap is harvested from the inner surfaces of the bilateral labia minora and urethral plate. The posterior labial frenulum is included at the distal end of the flap (Figures 2 and 3). Before elevating the flap, the labia minora are infiltrated with a subcutaneous injection of 1:400 000 epinephrine saline solution. The flap is raised from posteriorly to anteriorly with a blunt dissection. The corpora cavernosa clitoridis are straightened and lengthened by excising the chordae (Figure 4). If the vestibular bulbs are well developed anterior to the urinary orifice, they may be divided in the middle after ligation to avoid postoperative bleeding. Bulbospongiosus muscles are exposed bilaterally.



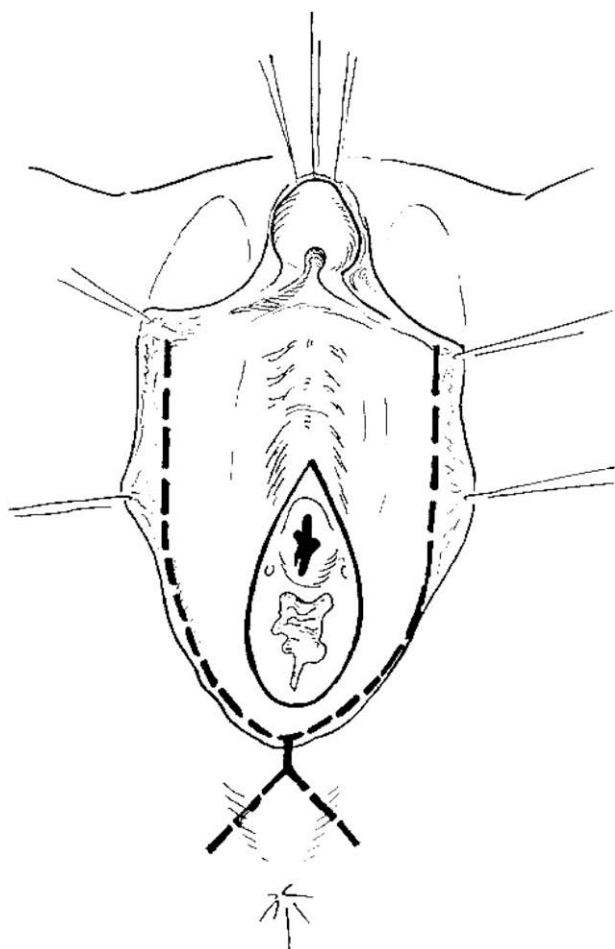
**Figure 2** Marking of the labial ring flap is made after suspending the glans of clitoris upwards and labia minora laterally.

An episiotomy is placed at the 5:00 o'clock direction on the posterior wall of the vagina to obtain a wide surgical field. An anterior vaginal flap, 3.5 cm wide and 5 cm long, is raised using right-angled dissection scissors after sub-mucomuscler injection of an epinephrine saline solution (Figures 5 and 6). After flap elevation the donor of the flap and episiotomy wound are sutured primarily after careful ligation of bleeding and application of a suction drainage tube. Y-V advancement of the perineal small triangular skin flap is performed into the episiotomy wound to avoid a potential circular stricture of the vaginal orifice.

The window of the inner ring is closed, and the flap is tubulised around a 16 Fr catheter. The neo-urethra is completed by joining the tubulised ring flap and anterior vaginal flap in an oblique fashion to avoid stricture (Figure 7). Then, the urethral anastomosis is covered by suturing the bilateral bulbospongiosus muscles at the midline after placing the suction drain beside the neo-urethra.

The lateral surfaces of the bilateral labia minora are sutured after placing Z-plasties to avoid ventral scar contracture of the newly constructed minipenis (Figure 8). A suprapubic cystostomy is placed, and the urethral catheter is replaced with a 10 Fr silicone tube to be used for postoperative irrigation. The vaginal cavity is packed firmly with petrolatum silicone gauze, and pressure dressing is applied on the perineal area.





**Figure 3** A circle shaped as drop of water is designed around the urethral meatus and vaginal orifice. The outer half ring is placed on the ridge of the labia minora. The labial ring flap is harvested from the inner surface of the bilateral labia minora and the 'urethral plate'. The posterior labial frenulum is included at the distal end of the flap. An episiotomy is placed to obtain wide surgical field.

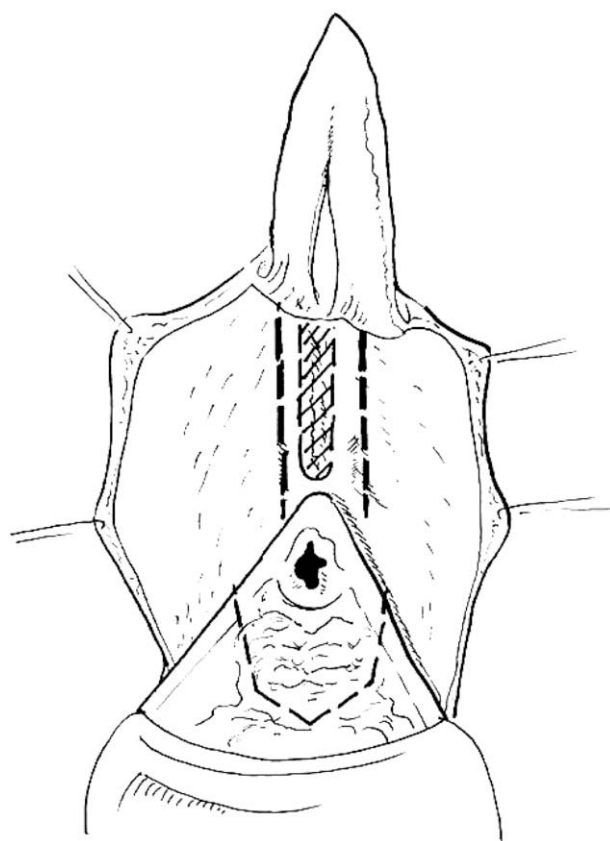
## Postoperative care

The patient remains in bed for 3 days to avoid post-operative bleeding. Neo-urethra is irrigated daily for 6 days until the start of voiding through the neo-urethra. Suprapubic cystostomy is removed as soon as the bladder residue after spontaneous micturition becomes less than 50 ml. Prophylactic antibiotics are given for 4 days to all patients, and subsequent oral antibiotics are prescribed for patients who develop cystitis associated with the cystostomy.

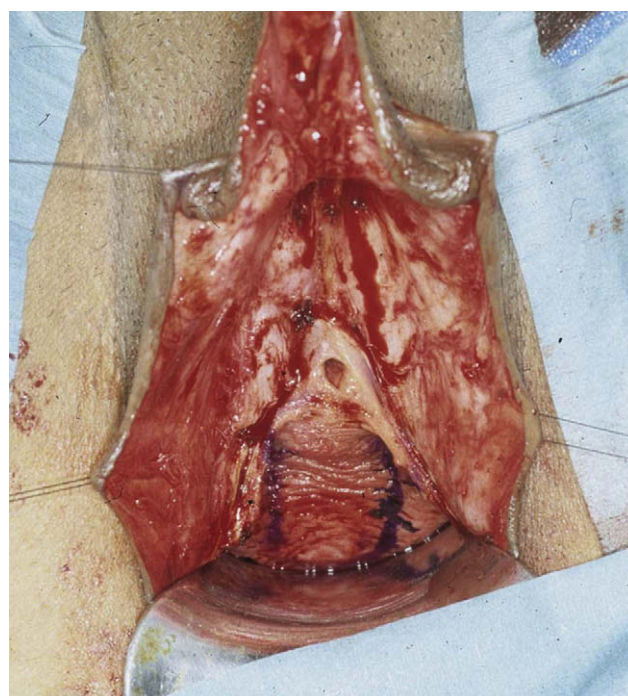
## Result

### Immediate postoperative complications (Table 2)

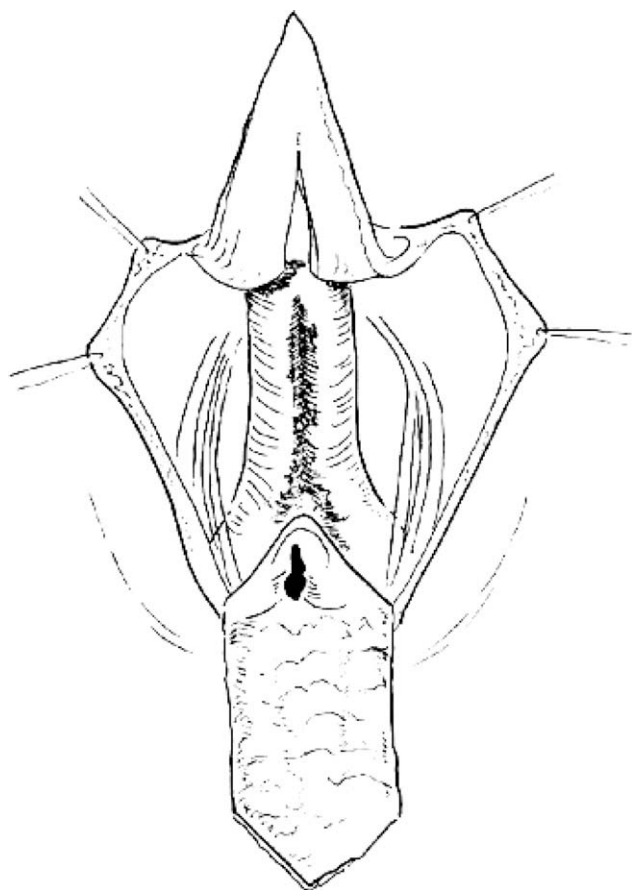
In 28 of 43 patients, the postoperative course after metaidoioplasty combined with oophorohysterectomy, was



**Figure 4** The dashed lines show the plan of incision to dissect the medial edges of the bulbospongiosum muscles. The chordae appears on the ventral surface of corpus cavernosum (oblique line).



**Figure 5** Anterior vaginal flap: 3.5 cm wide and 5 cm long.



**Figure 6** The anterior vaginal wall flap has been raised and exposed. After excising the chordae completely, the corpora cavernosa of clitoris are straightened and exposed. The bridge of the bilateral vestibular bulb is occasionally separated and ligated.

uneventful. Cystitis in three cases and haematoma in three cases were observed.

### Urethrocutaneous fistulas

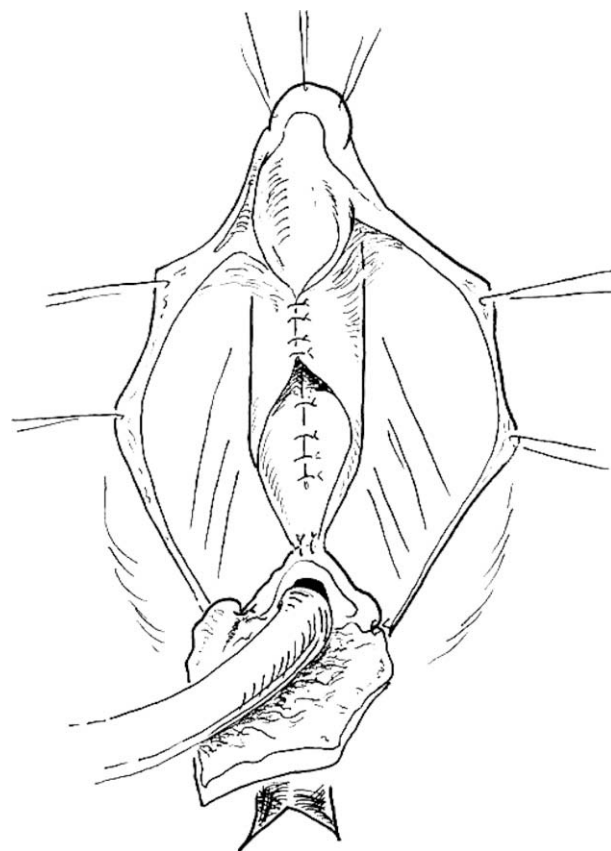
In 12 cases, urethrocutaneous fistula developed immediately after spontaneous micturition through the neo-urethra; however, eight were closed spontaneously within a month. The other four cases required fistula closure 6 months later under local anaesthesia as an outpatient procedure. In those who requested additional phalloplasty or scrotoplasty, the repair was performed at the time of surgery.

### Neo-urethra strictures

In three cases, a neo-urethra stricture was observed. Postoperative urethral balloon dilatation therapy was necessary in these patients.

### Postoperative micturination

Of the 43 cases, 29 can void in a standing position (Figure 9).



**Figure 7** The window of the inner ring of labial ring flap is closed, and the flap is tubulised around a catheter. The neo-urethra is completed by joining the tubulised ring flap and anterior vaginal flap in an oblique fashion to avoid stricture.

### Miscellaneous

The size of the neo-minipenis (clitopenoid) ranged from that of a little finger to a thumb according to the original size of the hormonally enlarged clitoris. Only one patient uses his minipenis for intercourse with his female partner. There were no complaints of a reduction of erogenous sensation on the clitoral glans.

An aesthetically more male-like appearance of the external genital was achieved by constructing a minipenis, flattening the area by destroying the labia minora and narrowing the vaginal orifice to almost the diameter of a little finger.

### Subsequent phalloplasty

In five of the 43 patients who desired a larger phallus, various phalloplasty techniques were used subsequently. The neo-urethra was used for urethroplasty in additional phalloplasty by connecting the transferred flap. Clitoral glands were implanted and externalised at the side of neo-phallus, thus preserving its sensitivity.

### Discussion

Using Hage's technique, the diameter of the neo-urethra was equivalent to a 12 Fr catheter due to the limited width

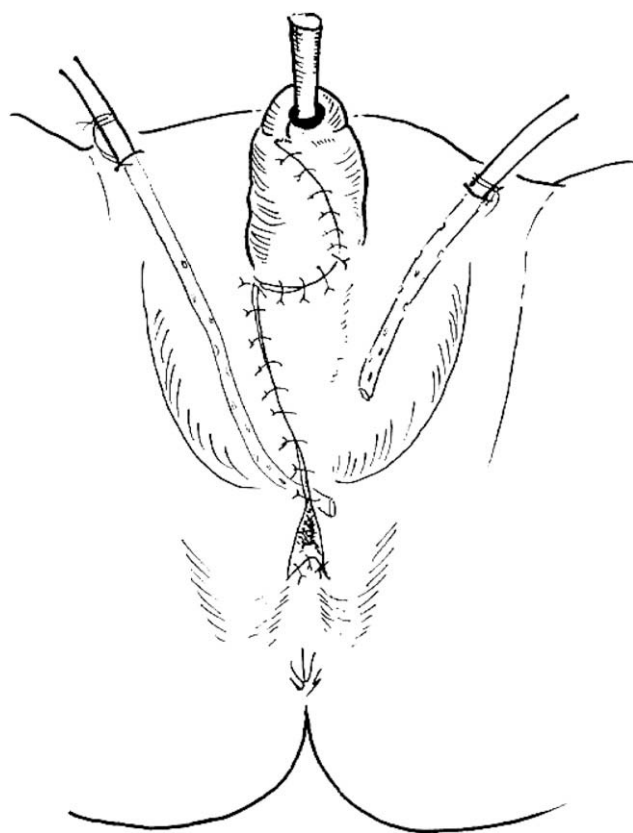


Figure 8 Visual aspect at the end of the surgery.

of unilateral labia minora in Japanese patients. Post-operative urethral balloon dilation therapy was necessary in almost all cases. The labial ring flap has a larger surface for neo-urethral construction. This flap is considered to be vascularised with bilateral anterior labial branches of the external pudendal artery, which is the main source and has rich vascular anastomoses between the posterior labial

branches of the perineal artery, urethral artery or dorsal artery of clitoris.<sup>12,13</sup> In spite of some concerns about reduced vascular supply when dissecting both the labial flaps up to the level of the phrenulum, good perfusion was always detected with an intra-operative fluorescein injection test on the proximal flap. Although the distal part of the flap can be formed in a random pattern, circulation can be secured in a bi-pedicle fashion due to the rich sub-dermal vascular network.

This procedure has a particular advantage over buccal mucosa urethral lengthening,<sup>15</sup> in that it does not require a second operative site to harvest the oral mucosa. This eliminates problems such as poor mouth healing and decreased saliva production.

The urinary stream was almost satisfactory, but the ability of voiding while standing was observed depending on sufficient enlargement of the clitoris by the precedent hormone therapy. The maximum length obtained in our series was 5 cm and the minimum was 2 cm. Some patients complain regarding the difficulties with male clothing or in the public lavatory. Therefore, it is noticed that our metaidoioplasty using labial ring flap would give excellent results if the patient is slender with a well-enlarged or elongated clitoral body.

Metaidoioplasty can preserve tactile and erogenous sensation on the clitoral glans and prepuce and clitoral erection. The shape of neo-minipenis is small but is natural looking without extensive scarring of the perineal region (Figure 9).

## Complications

In 12 cases, urethrocutaneous fistula developed immediately after spontaneous micturition through the neo-urethra, but was closed within a month when the diameter of the fistula was less than 1 mm. Fistulas were located at the junction of the two flaps. By covering the bulbospongiosus muscle over the junction of the two flaps, the risk of fistula formation could be reduced.

The fact of the matter is that it becomes difficult to insert a bladder catheter through the neo-urethra, because it curves at a right-angle to the point of the original external urinary meatus. The patient must be informed of this risk preoperatively because, if severe stenosis occurs, a suprapubic catheter would be the only emergency response. Competent neo-urethra of a simple suture line is essential in consideration of scar contracture.

## Subsequent phalloplasty

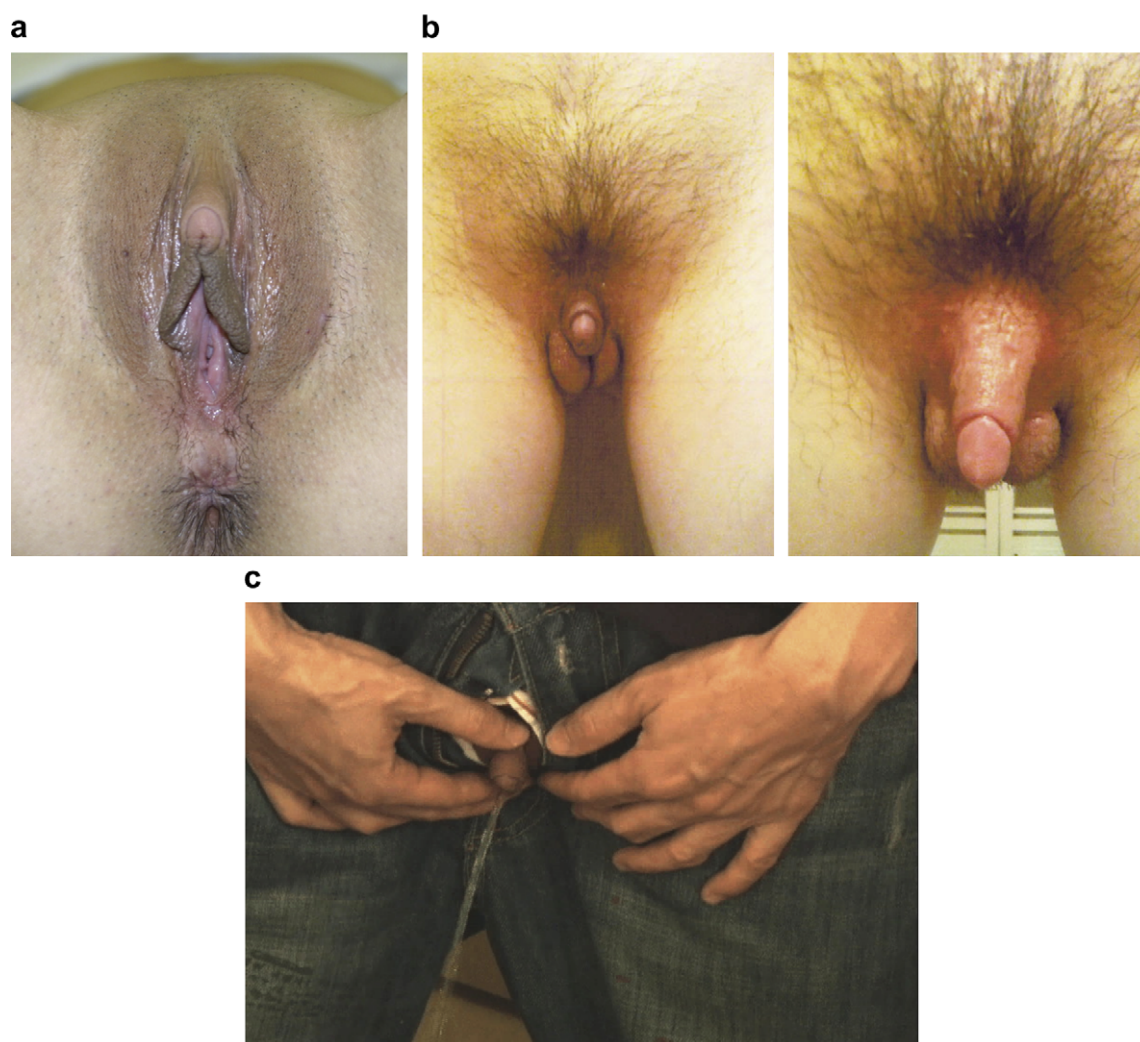
Admittedly, subsequent phalloplasty remains feasible even after performing any of the metaidoioplasty techniques, as Hage indicated,<sup>2</sup> and not much mention has been made in past literature on whether metaidoioplasty can work as the first step of the comprehensive genital conversion. Many of our patients, in fact, did not request additional phalloplasty after achieving a change of legal sex description following metaidoioplasty despite an inferior size or sex ability after metaidoioplasty. Perhaps the patients appreciate that phalloplasty is expensive, time-consuming, scar-producing and complicated surgery when weighed against

Table 2 Immediate postoperative complications and voiding.

	Hage's technique	Ring + VC	Ring - VC	Total
No complication	26	7	36	69(43)
Cystitis	11	4	24	38(28)
Bleeding	8	0	3	11(3)
Hematoma	1	0	0	1(0)
Fistula	2	0	3	5(3)
Spontaneous closure	13	1	11	25(12)
Urethrocutaneous fistula	5	1	7	13(8)
Secondary repair	8	0	4	12(4)
Stenosis	7	0	4	11(4)
Secondary repair	5	1	2	8(3)
Voiding in standing	3	0	0	3(0)
	11	5	24	40(29)

+VC, with vaginal closure; -VC, without vaginal closure; (), total with ring flap metaidoioplasty.





**Figure 9** Metaidoioplasty in a 35-year-old FTMTS. a. Preoperative view of the external genitalia after hormone treatment for 5 years. b. Postoperatively view of scrotoplasty performed using local flaps. c. Voiding in standing position.

the expected results of appearance, voiding or sexual function in general. Only five out of 22 patients of Perovic,<sup>3</sup> and 12 out of 70 patients of Hage<sup>4</sup> were reported to have had phalloplasty.

However, phalloplasty may be performed later if the patient wishes so. Then, competent urethra with a sufficient diameter and minimal scarring are preferable at the perineal part of the neo-urethra to avoid eventual stenosis. Yet another advantage of this procedure is that the scar of the labial ring flap metaidoioplasty does not obstruct subsequent surgery. Indeed, we found that the neo-urethra was advantageous in subsequent phalloplasties performed with either primary or secondary urethral anastomosis. In this context, urethroplasty using well-vascularised tissue is more reliable than mucosal graft.<sup>15</sup>

### Legal and social aspect

When a Japanese FTMTS patient's goal is to change one's legal sex description, not only a simple oophorectomy

but also a male-like appearance of the external genitalia as the result of surgery is stipulated.<sup>16</sup> Our metaidoioplasty technique fulfils the minimal legal requirements. Following this procedure, after 2004, 46 patients have obtained documents as men under the new Transgender Law, and five patients have married female partners as males after surgery.

From our experience of the first 68 of 75 FTM SRSs, if a competent neo-urethra is created by a well-vascularised tissue such as labial ring flap, metaidoioplasty should be the first operation of FTMSRS of external genitalia, either independently or as the first step, followed by phalloplasty if requested by the patient. However, a long-term follow-up is needed.

### Acknowledgement

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